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(54) **Automatic handling device for flexible flat products, in particular catamenial products, and intermediate stacker unit to be used therein**

(57) An automatic handling device for flexible flat products, in particular catamenials, comprises

- conveying means (2) on the infeed side for the serial guidance of the supplied products (1) in a main infeed direction (3),
- conveying means (4) on the outfeed side for the intermediate stacker units (5), the compartments (9) of which are charged with products (1), to be led off in a main outfeed direction (7) which is substantially perpendicular to the main infeed direction (3), and
- a feed head (8) for the products (1) between the conveying means (2, 4) on the infeed side and on the outfeed side, which oscillates about a pivoting axis (18) in the plane spanned by the main infeed direction (3) and outfeed direction (7) such that, during the oscillating motion in the main outfeed direction (7), the end (16) of the feed head (8) that is turned towards the respective intermediate stacker unit (5) is synchronous with the respective compartment (9) of the intermediate stacker unit (5) for a product (1) to be transferred into this compartment (9), and that, during the oscillating motion in the opposite direction, it orients itself toward the next compartment (9).

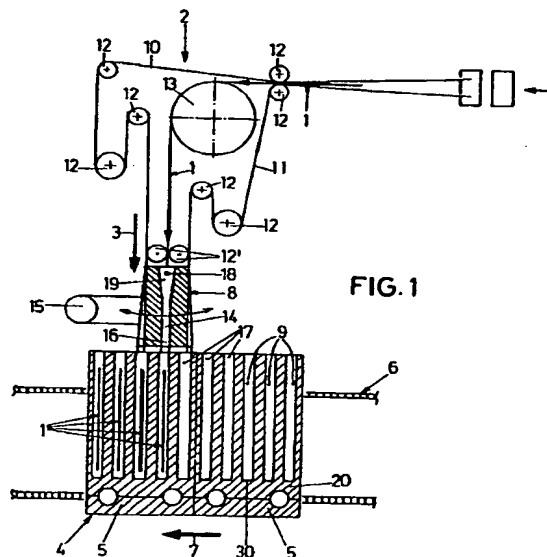


FIG. 1

Description

[0001] The invention relates to an automatic handling device for flexible flat products, in particular catamenial products such as sanitary towels, pantliners or the like, as well as to an intermediate stacker unit to be used in this handling device.

[0002] In the fabrication of the afore-said products, automatic handling during the virtual manufacturing process and subsequent packaging process poses special problems because of the flexibility and irregular shape of the products. Defined and gentle product treatment must be ensured for the manufacturing and subsequent packaging process to be performed reliably and with as little susceptibility to failure as possible.

[0003] The most varying handling devices for various flexible products are known from prior art. For instance, EP 0 356 654 A1 teaches an apparatus for the supply of packing blanks to a packaging machine in which cassettes are used that are open at the top. They comprise several stacks of blanks one beside the other. By means of a corresponding automatic conveyor, the cassettes are placed on a cassette conveyor which is disposed on the rear of the packaging machine, simultaneously serving as a storage area for a multitude of filled cassettes. In the vicinity of a discharging station, the stacks of blanks are successively removed from the cassettes and, by upward motion and ensuing transverse motion, supplied to one or several magazines of blanks of the packaging machine.

[0004] EP 0 465 207 B1 teaches a method and an apparatus for packaging resiliently deformable articles into a box-shape by using a sheet of film, in which the stack to be packaged is inserted into an inner cassette. The latter cooperates with an outer cassette and corresponding folding, overlapping and sealing means with a sheet of film placed in between so as to form a closed wrap around the said stack.

[0005] DE 43 42 112 C1 relates to an apparatus for the grouped packaging of filled tea bags, in which a stacking shaft is used for forming and fixing the row of bags. In the inlet area of the stacking shaft, retaining fingers which are fixed in the lengthwise direction are provided together with lengthwise displaceable bag holding means, the tea bags which are individually supplied by bag advancing means being positioned between them.

[0006] It is the object of the present invention to have an automatic handling device comply as optimally as possible with the processing requirements of flat flexible products and in particular of catamenial products such as sanitary towels, pantliners or the like so as to obtain high output rates accompanied with little susceptibility to failure. Due to the conventional structure of the manufacturing plant on the one hand and the packaging station on the other, the products are transferred from a continuous flow of serially supplied products into individual compartments of modular, continuously moving intermediate stacker units for the products thereby to be

led off to the packaging machine.

[0007] In accordance with the invention, the automatic handling device, for the purpose of this transfer, comprises

- conveying means on the infeed side for the serial guidance of the supplied products in a main infeed direction,
- conveying means on the outfeed side for the intermediate stacker units, the compartments of which are charged with products, to be led off in a main outfeed direction which is perpendicular to the main infeed direction, and
- a feed head for the products between the conveying means on the infeed side and on the outfeed side, which oscillates about a pivoting axis in the plane spanned by the main infeed and outfeed direction such that, during the oscillating motion in the main outfeed direction, the end of the feed head that is turned towards the respective intermediate stacker unit is synchronous with the respective compartment of the intermediate stacker unit for a product to be transferred into this compartment, and that, during the oscillating motion in the opposite direction, it orients itself toward the next compartment.

[0008] The gist of the invention resides in the oscillating feed head which ensures the intermediate stacker units to move continuously. This is of advantage since as a rule these intermediate stacker units are moved ahead by a comparatively voluminous chain drive, the stop and go operation of which, in the case of conventional handling devices, causes considerable strain on the handling device accompanied with corresponding wear because of the high inertias. In the case of the subject matter of the invention, only the feed head has to perform a discontinuous motion, which is by far easier to control in terms of machine equipment. Finally, as a result of the use of an intermediate stacker unit, the flexible products are properly guided during handling and kept definedly positioned for a subsequent packaging process. Consequently, a stacking job which is conventionally necessary for the flexible flat products can be carried out at a high speed, the stability of the stacking process being maintained and the mechanical strain on the plant being reduced.

[0009] Preferred embodiments of the handling device relate to the conveying means on the infeed side, to the design of the feed head in the form of an oscillating slotted block as well as the configuration of the intermediate stacker units as a conveying cassette having at least one take-up slot for the flat products.

[0010] As already mentioned at the outset, the invention also relates to an intermediate stacker unit in particular to be used in the afore-said handling device in a configuration as a conveying cassette having at least one slot. Preferred embodiments of the intermediate stacker unit relate to the shaping of this slot and espe-

cially to its contours. These are of special importance in particular in the handling of catamenial products such as sanitary towels or pantliners, since these articles have inherent variations in curvature and orientation in the delivery from the production line. The intermediate stacker unit in the form of a conveying cassette can compensate for these variations.

[0011] A substantial advantage of the conveying cassette slots contoured according to the invention resides in that on the one hand a wide opening is formed for the insertion of the product into the slot, which maximizes the so-called process window for the infeed of the product into the cassette. Simultaneously, during outfeed, a very accurately defined outfeed position of the product is produced by the narrowed section of the slot, which renders this handling job likewise more reliable.

[0012] Further details, in particular with a view to the intermediate stacker unit according to the invention, will become apparent from the ensuing description of an exemplary embodiment, taken in conjunction with the drawing, in which

- Fig. 1 is a diagrammatic plan view of a handling device,
- Fig. 2 is a plan view of a conveying cassette,
- Fig. 3 is a vertical section through the conveying cassette on the section line III-III of Fig. 2,
- Fig. 4 is a partially cut lateral view of the conveying cassette of Fig. 2,
- Fig. 5 is a front view of the conveying cassette from the direction of the arrow V of Fig. 2, and
- Figs. 6A and B are highly diagrammatic side views of details of the handling device at varying stations of product flow.

[0013] The automatic handling device for pantliners 1, which is diagrammatically outlined in Fig. 1, comprises conveying means 2 on the infeed side, denoted in their entirety by 2, for the serial guidance of the pantliners 1 in a main infeed direction 3 as well as conveying means 4 on the outfeed side. These conveying means 4 on the outfeed side substantially comprise individual intermediate stacker units 5 in the form of conveying cassettes which are disposed successively on a chain conveyor 6, leading the pantliners 1 off towards a packaging arrangement (not shown in detail) in a main outfeed direction 7 which is perpendicular to the main infeed direction 3. An oscillating feed head in the form of a slotted block 8 is disposed between the conveying

means 2, 4 on the infeed side and on the outfeed side, providing for the supply of one pantliner 1 at a time to the individual slot-type compartments 9 in the conveying cassettes 5, which will still be described in detail.

[0014] The conveying means 2 on the infeed side comprises a twin belt conveyor having two conveyor belts 10, 11 resting on each other and guided via corresponding guide pulleys 12. The two conveyor belts 10, 11 take the pantliner 1 serially one after the other from the production line and guide them via a deflection pulley 13 in the main infeed direction 3 to the slotted block 8. With reference to Fig. 1, the orientation of the pantliners 1 is such that their narrow side is upright relative to the plane of the drawing.

[0015] Through deflection of the two conveyor belts 10, 11, the pantliners 1 successively leave the guide pulleys 12 which mark the end of the conveying means 2 on the infeed side and enter the slot 14 of the slotted block 8. The latter's oscillating motion is synchronized by a corresponding oscillating drive mechanism 15 to combine with the continuous motion of the conveying cassettes 5 in the main outfeed direction 7 in such a way that when a pantliner 1 passes through the slot 14, the latter's end 16 on the outfeed side is in alignment with an inlet port 17 of the respective slot-type compartment 9 in the conveying cassette 5. Once a pantliner 1 is inserted in a compartment 9, the slotted block 8 orients itself towards the next slot-type compartment 9 by the oscillating motion counter to the main outfeed direction 7. Again the compartment 9 and the slotted block 8 run synchronous for the next pantliner 1 to be inserted into the conveying cassette 5. The slotted block 8 oscillates in the plane spanned by the main infeed direction 3 and the main outfeed direction 7 about a pivoting axis 18 roughly outlined in Fig. 1 in the vicinity of the end 19, on the infeed side, of the slotted block 8. As seen in Fig. 1, with a view to improving and obtaining increased reliability in the guidance of the pantliner by the slotted block 8, the end 19, on the infeed side, of the slot 14 widens in the way of a funnel, whereas the end 16 on the outfeed side is narrowed as opposed to the inlet port 17.

[0016] The design of the conveying cassettes 5 which constitute the intermediate stacker units can be seen in Figs. 2 to 5. They consist of a substantially cuboidal cassette 20 which is integrally produced from plastic material and in which slots 9 are molded parallel to the lengthwise direction, the slots 9 being open laterally and at the top for the accommodation of in each case one pantliner 1 in an upend condition set on its longitudinal edge. The lateral open side of the slots 9 constitute the inlet ports 17, on the infeed side, of the slots which are provided with a funnel-type enlargement 21 towards the upper edge of the cassette as seen in Fig. 2. This enlargement 21 is formed by a projection 24 on the cassette partitions 25 which define the slots 9, this projection 24 extending as an upwardly skewed acclivity 23 from the bottom 22 of the conveying cassette 5. As seen in Fig. 3, each slot 9 is divided in depth

26 into a lower narrow portion 27 and an upper expanded portion 28. The depth 26 of the slots 9 corresponds to approximately half the height 29 of a pantiliner 1 lodging edgewise in the slot 9 (Fig. 6). Another characteristic of the shape of the slots 9 resides in that ahead of their closed end 30 which is opposite to the inlet port 17 they possess a smaller, reduced section 31 where the embossed rim of the pantiliner takes its place.

[0017] The purpose of the shape explained above of the inlet port 17 of the slots 9 will be explained, based on Fig. 6A. Fig. 6A diagrammatically outlines the condition in which the slotted block 8 and the conveying cassette 5 run synchronous. As seen in this drawing, the slotted block 8 possesses a nose 32 of an inclination that corresponds to the acclivity 23, this nose 32 forming the end 16, on the outfeed side, of the slot 14. When a pantiliner 1 passes from the slotted block 8 into the conveying cassette 5, the advancing edge 33 of the pantiliner 1 first enters the slot 9 in the vicinity of the funnel-type enlargement 21 at the top of the conveying cassette 5. The funnel-type shape helps attain on the one hand unimpeded passage of the advancing edge 33 into the slot 9 and on the other hand guidance and positioning of the pantiliner 1 in the conveying cassette 5 that become narrower and thus more defined as the depth of entry increases. As a result of the lower narrow portion 27, in particular the lower embossed lengthwise edge of the pantiliner is well guided and positioned with a view to its subsequent entry into a packaging station.

[0018] This entry is roughly outlined in Fig. 6B which shows the conveying cassette 5 to be in opposition of a product guide 34. Again the edge 35, on the cassette side, of this guide 34 is inclined to match the acclivity 23. When the pantiliner 1 is pushed out of the conveying cassette 5 in the outfeed direction 36, the lower edge of the pantiliner 1 is the first to pass into product guide 34. The position of this lower end portion 37 is well defined by the narrow portion 27 of the slots 9 so that a proper passage of the pantiliner 1 from the conveying cassette 5 into the product guide 34 is ensured. The in this case advancing edge 33' passes into the product guide only at a later time when a good guiding effect has again been achieved by the lower edge.

Claims

1. An automatic handling device for flexible flat products, in particular catamenial products (1) such as sanitary towels, pantliners or the like, for the transfer of the products (1) from a continuous flow of serially supplied products (1) into individual compartments (9) of modular, continuously moving intermediate stacker units (5) for the products (1) to be led off in particular to a packaging machine, comprising
 - conveying means (2) on the infeed side for the serial guidance of the supplied products (1) in a main infeed direction (3),
 - conveying means (4) on the outfeed side for the intermediate stacker units (5), the compartments (9) of which are charged with products (1), to be led off in a main outfeed direction (7) which is substantially perpendicular to the main infeed direction (3), and
 - a feed head (8) for the products (1) between the conveying means (2, 4) on the infeed side and on the outfeed side, which oscillates about a pivoting axis (18) in the plane spanned by the main infeed direction (3) and outfeed direction (7) such that, during the oscillating motion in the main outfeed direction (7), the end (16) of the feed head (8) that is turned towards the respective intermediate stacker unit (5) is synchronous with the respective compartment (9) of the intermediate stacker unit (5) for a product (1) to be transferred into this compartment (9), and that, during the oscillating motion in the opposite direction, it orients itself toward the next compartment (9).
2. A handling device according to claim 1, characterized in that the conveying means (2) on the infeed side are twin conveyor belts (10, 11) conveying the product (1) between them.
3. A handling device according to claim 1, characterized in that the feed head is an oscillating slotted block (8), the slot (14) of which serves as a guide for the product (1).
4. A handling device according to claim 3, characterized in that the slot (14) widens in the way of a funnel at its end (19) on the infeed side.
5. A handling device according to claim 3, characterized in that the end (16), on the outfeed side, of the slot (14) is narrowed as opposed to the latter's end (19) on the infeed side.
6. A handling device according to claim 1, characterized in that the intermediate stacker units of the conveying means (4) on the outfeed side are conveying cassettes (5) provided with at least one accommodation slot (9) as a compartment.
7. An intermediate stacker unit, in particular for use in a handling device according to claim 1, characterized in that it is a conveying cassette (5) having at least one slot (9) for the accommodation of a product (1) in an upend condition.
8. An intermediate stacker unit according to claim 7, characterized in that each slot (9) is divided in

depth (26) into a lower narrow portion (27) and an upper expanded portion (28).

9. An intermediate stacker unit according to claim 7, characterized in that each slot (9) is provided with a funnel-type enlargement (21) at its end on the infeed side. 5
10. An intermediate stacker unit according to claim 8, characterized in that the funnel-type enlargement (21) is a tapering projection (24) of the conveying cassette (5) partition (25) which defines the slot (9), the projection (24) extending as an upwardly skewed acclivity (23) from the bottom of the conveying cassette (5). 10 15
11. An intermediate stacker unit according to claim 7, characterized in that the depth (26) of the slot (9) corresponds to approximately half the height (29) of the product (1) lodging therein in an upend condition. 20
12. An intermediate stacker unit according to claim 7, characterized in that each slot (9) is closed at its end (30) opposite to the end on the infeed side. 25

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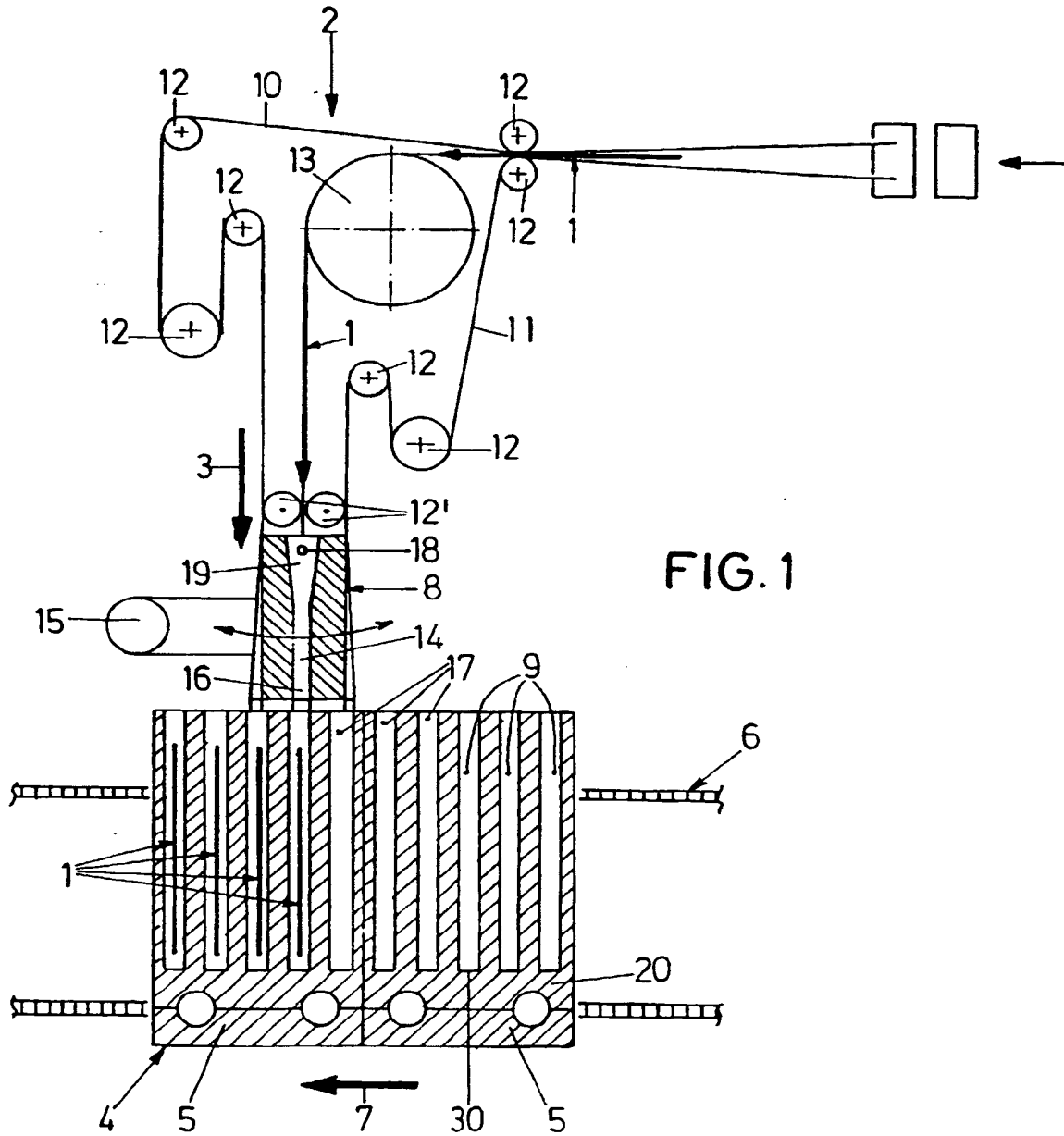


FIG. 1

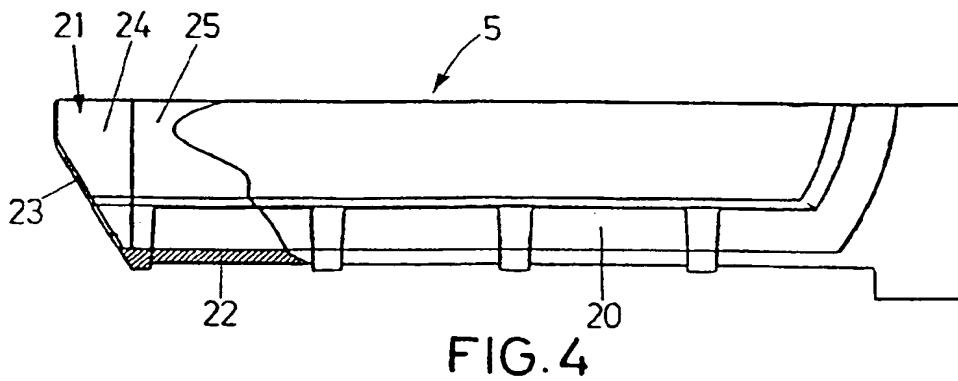
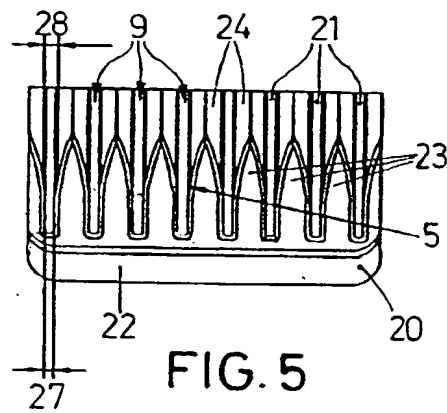
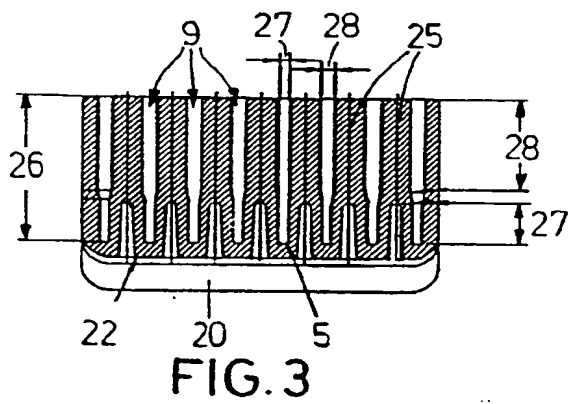
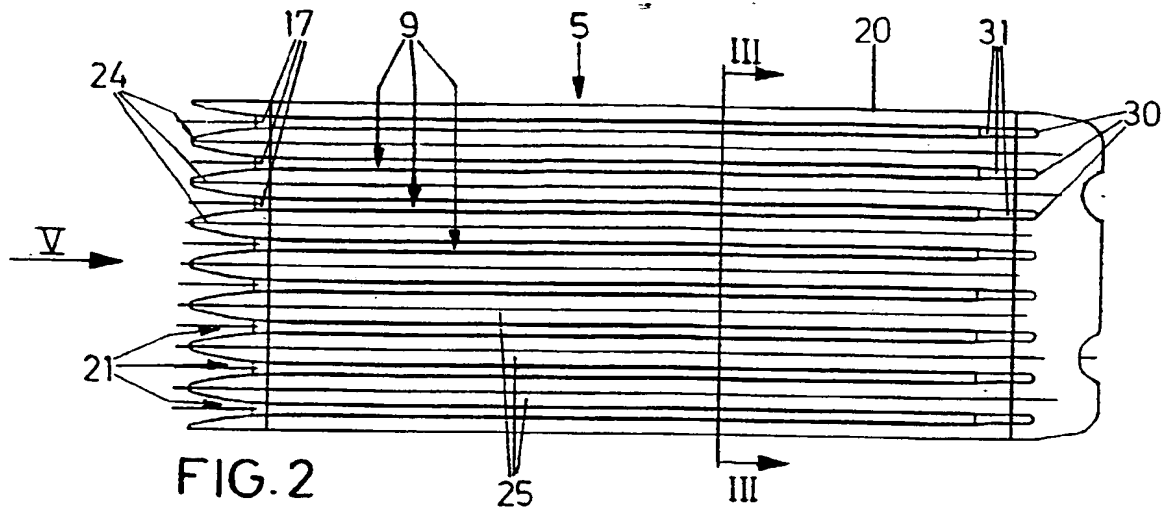


FIG.6A

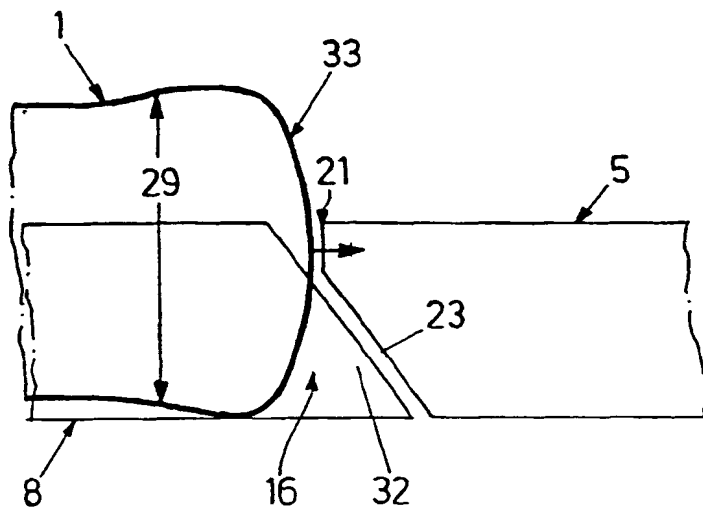
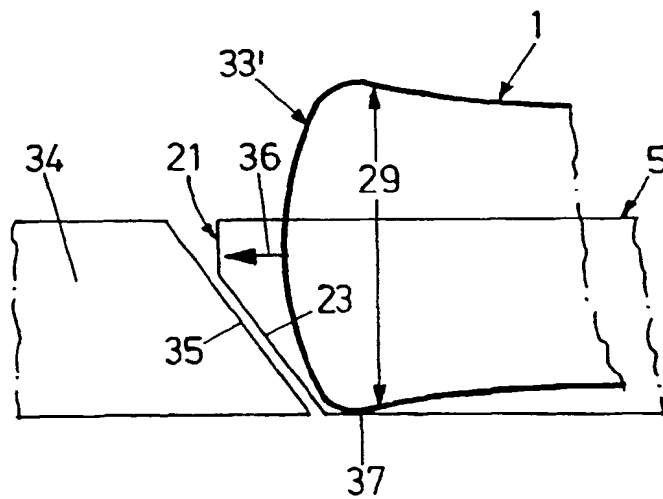


FIG.6B





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 98 12 0073

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION
X	EP 0 534 902 A (SIG) 31 March 1993 (1993-03-31) * column 1, line 48 - column 3, line 7; figures 1-3 *	1,6	B65G47/52 B65G17/32
Y	---	2	
Y	US 5 127 209 A (S.A. HUNTER) 7 July 1992 (1992-07-07) * column 3, line 26 - column 4, line 15; figures 1-5 *	2	
X	EP 0 192 206 A (MICROHANDLING HANDHABUNGSGERÄTE) 27 August 1986 (1986-08-27) * abstract; figure 1 *	7,8,12	
X	US 4 520 925 A (D.M. JOHNSON) 4 June 1985 (1985-06-04) * column 4, line 13-34; figures 1,2,5 *	7	
X	US 3 954 165 A (C.A. SNYDER) 4 May 1976 (1976-05-04) * abstract; figure 1 *	7,12	TECHNICAL FIELDS SEARCHED B65G B65B B65H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 August 1999	Examiner Grentzius, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03 82 (P04/C01)



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Application Number

EP 98 12 0073

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 98 12 0073

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-6

An automatic handling device for transferring products into continuously moving stacker units by means of an oscillating feed head.

2. Claims: 7-12

An intermediate stacker unit comprising a cassette with at least one slot.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 12 0073

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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23-08-1999

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